CLAIMS

WHAT IS CLAIMED IS:

1. In a portable battery powered system,

a portable battery powered utilization device for operating from battery power during portable operation thereof,

battery means operatively coupled with said utilization device for supplying operating power thereto, and

battery conditioning system means operatively coupled with said battery means and comprising battery conditioning means for controlling conditioning of said battery means, and battery parameter sensing means for sensing battery parameters,

said utilization device together with said battery means and said battery conditioning system means having a size and weight to be carried by an individual person, and

said battery conditioning system means including operating means operatively coupled with said battery conditioning means and controlling conditioning of said battery means in conjunction with said battery parameter sensing means.

S.E.K. 5-17-81

2. A portable battery powered system according to claim 1, with

P1 said utilization device having battery receiving means for removably receiving said battery means and having charging voltage receiving means coupled with said battery conditioning means for supplying a charging voltage to said battery means under the control of said battery parameter sensing means.

3. A portable battery powered system according to claim 1, with

P1 said utilization device having a housing, and said battery conditioning system means being contained in said housing as an integral part of said utilization device during portable operation thereof.

4. A portable battery powered system in accordance with claim 1, with

P1 said operating means comprising data processing means operatively coupled with said battery means for operation from battery power.

5. A portable battery powered system in accordance with claim 4, with

P1 said battery conditioning system means including display means operatively coupled with said data processing means and providing for the display of data messages pertaining to the condition of said battery means.

6. A portable battery powered system according to claim 1, with

said operating means comprising data processing means operatively coupled with said battery means for operation from battery power,

said data processing means requiring a minimum battery voltage value from said battery means,

said utilization device having battery receiving means for removably receiving said battery means and having charging voltage receiving means coupled with said battery conditioning means for supplying a charging voltage to said battery means under the control of said battery parameter sensing means then, and

said charging voltage receiving means supplying operating voltage to said data processing means during a discharge of said battery means to a battery voltage substantially less than said minimum battery voltage value under the control of said battery conditioning means.

7. A portable battery powered system according to claim 1, with

said operating means including memory means electrically powered by said battery means during portable operation of said battery means, and said memory means being operable for storing data

based on a deep discharge conditioning of said battery means under the control of said battery conditioning means.

8. A portable battery powered system according to claim 1, with

said battery conditioning means comprising battery charge flow control means operatively coupled with said battery means for controlling the charge flow from the battery means during a conditioning operation,

said operating means including memory means for storing battery operation data and said operating means being operatively coupled with said battery means for storing data in said memory means representative of the use of said battery means during portable operation.

9. A portable battery powered system according to claim 1, with said battery conditioning means further comprising

charging control means operatively coupled with said battery means for controlling the rate of charging of said battery means.

10. A portable battery powered system according to claim 9, with

said charging control means being controllable by said operating means to effect charging of said battery means at selectable different rates.

11. A portable battery powered system according to claim 1, with

said battery ~~system conditioning~~ conditioning system means having a battery charging voltage input forming part of a battery charging current path for said battery means,

charging current regulating means operatively coupled with said battery charging voltage input and operative to control the magnitude of the charging current supplied to said battery means via said battery charging current path, and

said charging current regulating means having a control input for receiving a charging level control signal and being operative to control the charging current supplied to said battery means in accordance with said charging level control signal.

12. A portable battery powered system according to claim 1, with said battery parameter sensing means comprising

battery voltage sensing means operatively coupled with said battery means for sensing battery voltage during a battery conditioning operation.

13. A portable battery powered system according to claim 1, with said battery parameter sensing means comprising

battery temperature sensing means operatively coupled with said battery means for sensing the temperature of the battery means during a battery conditioning operation.

14. A portable battery powered system according to claim 1, with said battery conditioning means comprising

battery discharge mode control means operatively coupled with said battery means for controlling discharge of the battery means prior to recharge thereof, for the purpose of conditioning of the battery means and prolonging its useful life.

15. A portable battery powered system according to claim 14, with

said battery discharge mode control means comprising discharge current control means operatively coupled with said battery means and providing a battery current discharge path capable of discharging the battery means down to a deep discharge level during a deep discharge cycle having a time duration of not more than ten hours.

16. In a battery conditioning system,

rechargeable battery receiving means for receiving a rechargeable battery means for conditioning,

battery conditioning system means coupled with said battery receiving means for effecting deep discharge and recharging cycles of a battery means received thereby,

said battery conditioning system means comprising battery discharge means for effecting a deep discharge cycle of the battery means and including battery condition sensing means for sensing a battery discharge

condition, and comprising memory means operatively coupled with said battery condition sensing means and operative for storing data based on a deep discharge cycle of a battery means so as to provide a measure of its capacity.

17. A battery conditioning system according to claim 16, with said battery conditioning sensing means comprising

battery voltage sensing means operatively coupled with said battery receiving means and operative to sense the output voltage of a battery means during a deep discharge cycle.

18. A battery conditioning system according to claim 16, with said battery conditioning system means comprising a microprocessor operatively coupled with said battery condition sensing means and operable for controlling said memory means to effect the storage therein of said data based on a deep discharge cycle of a battery means.

19. In a battery conditioning system,

battery receiving means for operative coupling with a portable battery pack of a size and weight such as to be operatively coupled to and carried with a portable battery powered device by an individual person,

during a conditioning operation, and

battery conditioning system means operatively coupled with said battery receiving means and operative for automatically effecting a deep discharge and a recharging of a battery pack coupled with said receiving means.

20. A battery conditioning system in accordance with claim 19, with said battery conditioning system means comprising programmed processor means for effecting a deep discharge cycle of said battery pack as a measure of battery capacity.

21. A battery conditioning system in accordance with claim 19, with said battery conditioning system means being operative to sense battery parameters during a battery charging operation.

22. A battery conditioning system in accordance with claim 19, with said battery conditioning system means comprising digital processor means and memory means controlled by said processor means for obtaining a measure of battery capacity during a deep discharge cycle of a battery pack received by said receiving means.

23. In a battery conditioning system,

battery receiving means for operative coupling with a battery means comprising a rechargeable electrochemical energy storage medium having an output voltage which is a function not only of the energy stored thereby but also of the number of shallow energy discharge cycles which have occurred after its last deep discharge cycle,

battery conditioning system means operatively coupled with said battery receiving means and automatically operable for effecting a deep discharge cycle wherein the battery output voltage is reduced to a value below its minimum operating voltage for reliable operation.

24. A battery conditioning system in accordance with claim 23, with

said battery conditioning system means comprising digital processor means operatively coupled with said battery receiving means for sensing when the battery output voltage is reduced to a value below said minimum operating voltage so as to terminate the deep discharge cycle.

25. A battery conditioning system in accordance with claim 24, with said digital processor means having display means for displaying a measure of battery capacity based on a deep discharge cycle of a battery means received by said receiving means.

26. A battery conditioning system according to claim 23, with

said battery conditioning system means comprising battery discharge circuit means operatively coupled with said battery receiving means and controllable to effect a deep discharge cycle of a battery means such that the output voltage of the battery means falls below said minimum operating voltage.

27. A battery conditioning system according to claim 26, with

said battery conditioning system means comprising automatic discharge energy determining means operatively coupled with said battery receiving means for determining a measure of the amount of energy supplied by a battery means during a deep discharge cycle as a measure of the condition of the battery means.

28. A battery conditioning system in accordance with claim 27, with said battery conditioning system means further comprising

P1 memory means operatively coupled with said discharge energy determining means to store a battery capacity indication based on the amount of energy supplied by a battery means during a deep discharge cycle.

29. In a battery conditioning system,

a portable battery powered utilization device for operating from battery power during portable operation thereof,

battery means operatively coupled with said utilization device for supplying operating power thereto, and

battery conditioning system means operatively coupled with said battery means for effecting deep discharge and recharging cycles thereof,

said battery conditioning system means comprising battery condition sensing means for sensing a battery discharge condition and comprising memory means operatively coupled with said battery condition sensing means and operative for storing data based on a deep discharge cycle so as to provide a measure of battery capacity.

30. A battery conditioning system according to claim 29, with said battery discharge condition sensing means comprising battery voltage sensing means coupled with said battery means, and said battery conditioning system means being coupled with said battery voltage sensing means for terminating a deep discharg cycle when the battery voltage is reduced to a predetermined value.

End